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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,527	01/23/2006	Nikolai Alekseevich Baranov	YOU.00001	2442

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EXAMINER	
YIP, JACK	

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3715	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/565,527	BARANOV ET AL.	
	Examiner	Art Unit	
	JACK YIP	3715	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 December 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17,18,20-22 and 24-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18,20-22 and 24-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the amendment filed 12/16/2010; claims 17 - 18, 20 - 22, 24 - 31 are pending; claims 1 - 16, 19, 23 are cancelled.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claims 17 - 18, 20 - 22, 24 - 31 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.** The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1, 24, 30 - 31 recite (amendment, pg 3, pg 5, pg 11, pg 14) "evaluation of <u>any</u> aircraft additional forces and moments"; it's unclear from applicant's origin specification for supporting this limitation.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. **Claim 31 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.** Claim 31 recites the limitation "<u>the</u> nulling event" on pg 15. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 17 - 18, 20 - 22, 24 - 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over

"Microsoft Flight Simulator Handbook" by Jonathan M. Stern (Copyright 1995) (denoted hereinafter as Stern) in view of

"S-Wake Assessment of Wake Vortex Safety" (unclassified May 2003) by National Aerospace Laboratory (denoted herein as "NLR") and

"A piloted simulation study of wake turbulence on final approach" (1998) by Eric C. Stewart of NASA Langley Research Center (denoted herein as NASA).

Re claims 17, 24, 30 - 31:

[Claim 17] Stern discloses a flight simulator system for training pilots (Stern, pg 296 - 297, "Flight simulator's thunderstorms contain airframe icing conditions and turbulence"; pgs 298 - 300, comprising:

a module (1) for control of the simulator modes is capable of choosing a training scenario (Stern, chapter 15, from pg 336; chapter 17, from pg 372; i.e., pg 6, "Boston to Windsor Locks", "Los Angeles to San Francisco", "Port Angeles to Everett", "Champaign to Chicago", "Chateaudun to Paris", "Innsbruck to Munich") and controlling operation of a plurality of simulator modules (Stern, chapter 2, from pg 44);

a training scenarios database module (2) (Stern, pgs 573 - 582, "Standard Flight Simulator Database");

a module (3) for commutation of the simulator modules (Stern, pg 13, "flying procedures on a personal computer using Microsoft Flight Simulator."; pg 29, "computer"; "Flight Simulator provides a variety of means to control the simulated airplanes, including control yoke or joystick, keyboard, or mouse. If you have a control yoke or joystick connected to your computer, you should use it to control the simulated airplane." a computer is inherently included CPU for commutation of the simulator modules.);

a module (4) for imitation of an outside visual situation, a visual part of the air space and a ground surface in real time (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs

226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows an outside visual situation, an air space and a ground surface.);

a module (6) for simulation of a pilot workplace (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows a pilot workplace (instrument panel));

a module (5) for simulation of an aviation instrument panel with an indication of a plurality of aircraft engine modes (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows an aviation instrument panel ; pg 34, "The throttle position indicator moves from the bottom to the top of its travel" - aircraft engine modes);

a module (8) for simulation of a plurality of controls for a plurality of aircraft units and systems (Stern, pgs 195 - 199, "Instrument, Lear 35A, Cessna 182RG"; Stern shows a plurality of controls for different aircraft units; pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows a plurality of aircraft units and system.);

a module (7) for simulation of a plurality of ambient parameters (Stern, pgs 283 - 312, "Chapter 13, Meteorology", i.e., pg 298, "Turbulence settings", pg 301, "cloud setting", from pg 303, "Weather Settings, Global Weather Settings, Area Weather Setting");

information on aircraft position (Stern, pgs 21 - 43, "Chapter 1: Your First Flight"; pg 33), flight velocity (Stern, pg 85, "Airspeed Indicator"), angular rates (Stern, pg 100, "bank angle"), and geometrical characteristics (Stern, pg 52, "Wings come in a variety of sizes, shapes, and configurations. There are bi-wing airplanes, tri-wing airplanes, and mono-wing airplanes.") received from a module (11) for simulation of the aircraft dynamics;

wherein the module (11) for simulation of the aircraft dynamics is forming signals imitating the aircraft forces and moments according to the training scenario (NLR, pg 70 - 76, pg 70, "Basic Aeordynamics", pg 72, "Forces Acting on the Airplane"; pg 74, "The torque of the engine causes a left rolling tendency").

[Claim 24] Stern discloses a flight simulator system for training pilots, the flight simulator system (Stern, pg 296 - 297, "Flight simulator's thunderstorms contain airframe icing conditions and turbulence"; pgs 298 - 300), comprising:

a module (1) for control of the simulator modes is capable of choosing a training scenario (Stern, chapter 15, from pg 336; chapter 17, from pg 372; i.e., pg 6, "Boston to Windsor Locks", "Los Angeles to San Francisco", "Port Angeles to Everett", "Champaign to Chicago", "Chateaudun to Paris", "Innsbruck to Munich") and controlling operation of a plurality of simulator modules (Stern, chapter 2, from pg 44);

a training scenarios database module (2) (Stern, pgs 573 - 582, "Standard Flight Simulator Database");

a module (3) for commutation of the simulator modules (Stern, pg 13, "flying procedures on a personal computer using Microsoft Flight Simulator."; pg 29, "computer"; "Flight Simulator provides a variety of means to control the simulated airplanes, including control yoke or joystick, keyboard, or mouse. If you have a control yoke or joystick connected to your computer, you should use it to control the simulated airplane." a computer is inherently included CPU for commutation of the simulator modules.);

a module (4) for imitation of an outside visual situation, visual part of the air space and ground surface in real time (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows an outside visual situation, an air space and a ground surface.);

a module (6) for simulation of the pilot workplace (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows a pilot workplace (instrument panel));

a module (5) for simulation of an aviation instrument panel with an indication of a plurality of aircraft engine modes (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows an aviation instrument panel ; pg 34, "The throttle position indicator moves from the bottom to the top of its travel" - aircraft engine modes);

a module (8) for simulation of a plurality of controls for a plurality of aircraft units and systems (Stern, pgs 195 - 199, "Instrument, Lear 35A, Cessna 182RG"; Stern shows a plurality of controls for

different aircraft units; pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows a plurality of aircraft units and system.);

a module (7) for simulation of a plurality of ambient parameters (Stern, pgs 283 - 312, "Chapter 13, Meteorology", i.e., pg 298, "Turbulence settings", pg 301, "cloud setting", from pg 303, "Weather Settings, Global Weather Settings, Area Weather Setting");

a module (9) for simulation of a wake vortex situation caused by an aircraft is capable of determining a vortex generator wake vortex path as a set of the vorticity region centers and intensity on the basis of information from the training scenarios database module (2) and information from the module (7) for simulation of the ambient parameters (Stern, pg 298 - pg 300; pg 283 - pg 312);

[Claim 30] Stern discloses a flight simulator system for training pilots (Stern, pg 296 - 297, "Flight simulator's thunderstorms contain airframe icing conditions and turbulence"; pgs 298 - 300), comprising:

a module (1) for control of the simulator modes is capable of choosing a training scenario (Stern, chapter 15, from pg 336; chapter 17, from pg 372; i.e., pg 6, "Boston to Windsor Locks", "Los Angeles to San Francisco", "Port Angeles to Everett", "Champaign to Chicago", "Chateaudun to Paris", "Innsbruck to Munich") and controlling operation of a plurality of simulator modules (Stern, chapter 2, from pg 44);

a training scenarios database module (2) (Stern, pgs 573 - 582, "Standard Flight Simulator Database");

a module (3) for commutation of the simulator modules (Stern, pg 13, "flying procedures on a personal computer using Microsoft Flight Simulator."; pg 29, "computer"; "Flight Simulator provides a variety of means to control the simulated airplanes, including control yoke or joystick, keyboard, or mouse. If you have a control yoke or joystick connected to your computer, you should use it to control the simulated airplane." a computer is inherently included CPU for commutation of the simulator modules.);

a module (4) for imitation of outside visual situation, a visual part of the air space and ground surface in real time (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows an outside visual situation, an air space and a ground surface.);

a module (6) for simulation of a pilot workplace (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows a pilot workplace (instrument panel));

a module (5) for simulation of an aviation instrument panel with indication of a plurality of aircraft engine modes (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows an aviation instrument panel ; pg 34, "The throttle position indicator moves from the bottom to the top of its travel" - aircraft engine modes);

a module (8) for simulation of a plurality of controls for a plurality of aircraft units and systems (Stern, pgs 195 - 199, "Instrument, Lear 35A, Cessna 182RG"; Stern shows a plurality of controls for different aircraft units; pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows a plurality of aircraft units and system.);

a module (7) for simulation of the ambient parameters (Stern, pgs 283 - 312, "Chapter 13, Meteorology", i.e., pg 298, "Turbulence settings", pg 301, "cloud setting", from pg 303, "Weather Settings, Global Weather Settings, Area Weather Setting"),

information on aircraft position (Stern, pgs 21 - 43, "Chapter 1: Your First Flight"; pg 33), flight velocity (Stern, pg 85, "Airspeed Indicator"), angular rates (Stern, pg 100, "bank angle"), and geometrical characteristics (Stern, pg 52, "Wings come in a variety of sizes, shapes, and configurations. There are bi-wing airplanes, tri-wing airplanes, and mono-wing airplanes.") received from a module (11) for simulation of the aircraft dynamics;

wherein the module (11) for simulation of the aircraft dynamics is forming signals imitating the aircraft forces and moments according to the training scenario (NLR, pg 70 - 76, pg 70, "Basic Aeordynamics", pg 72, "Forces Acting on the Airplane"; pg 74, "The torque of the engine causes a left rolling tendency").

[Claim 31] Stern discloses a flight simulator system for training pilots (Stern, pg 296 - 297, "Flight simulator's thunderstorms contain airframe icing conditions and turbulence"; pgs 298 - 300), comprising:

a module (1) for control of the simulator modes is capable of choosing a training scenario (Stern, chapter 15, from pg 336; chapter 17, from pg 372; i.e., pg 6, "Boston to Windsor Locks", "Los Angeles to San Francisco", "Port Angeles to Everett", "Champaign to Chicago", "Chateaudun to Paris", "Innsbruck to Munich") and controlling operation of a plurality of simulator modules (Stern, chapter 2, from pg 44);

a training scenarios database module (2) (Stern, pgs 573 - 582, "Standard Flight Simulator Database");

a module (3) for commutation of the simulator modules (Stern, pg 13, "flying procedures on a personal computer using Microsoft Flight Simulator."; pg 29, "computer"; "Flight Simulator provides a variety of means to control the simulated airplanes, including control yoke or joystick, keyboard, or mouse. If you have a control yoke or joystick connected to your computer, you should use it to control the simulated airplane." a computer is inherently included CPU for commutation of the simulator modules.);

a module (4) for imitation of an outside visual situation, a visual part of the air space and a ground surface in real time (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows an outside visual situation, an air space and a ground surface.);

a module (6) for simulation of a pilot workplace (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows a pilot workplace (instrument panel));

a module (5) for simulation of an aviation instrument panel with an indication of a plurality of aircraft engine modes (Stern, pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows an aviation instrument panel ; pg 34, "The throttle position indicator moves from the bottom to the top of its travel" - aircraft engine modes);

a module (8) for simulation of a plurality of controls for a plurality of aircraft units and systems (Stern, pgs 195 - 199, "Instrument, Lear 35A, Cessna 182RG"; Stern shows a plurality of controls for different aircraft units; pg 26 - 27; pgs 40 - 41; pg 150; pg 34 - 35; pg 100 - 101; pgs 194 - 195; pgs 226 - 228; pg 406; pg 498; pgs 509 - 510; Stern shows a plurality of aircraft units and system.);

a module (7) for simulation of a plurality of ambient parameters (Stern, pgs 283 - 312, "Chapter 13, Meteorology", i.e., pg 298, "Turbulence settings", pg 301, "cloud setting", from pg 303, "Weather Settings, Global Weather Settings, Area Weather Setting");

information on aircraft position (Stern, pgs 21 - 43, "Chapter 1: Your First Flight"; pg 33), flight velocity (Stern, pg 85, "Airspeed Indicator"), angular rates (Stern, pg 100, "bank angle"), and geometrical characteristics (Stern, pg 52, "Wings come in a variety of sizes, shapes, and configurations. There are bi-wing airplanes, tri-wing airplanes, and mono-wing airplanes.") received from a module (11) for simulation of the aircraft dynamics;

wherein the module (11) for simulation of the aircraft dynamics is forming signals imitating the aircraft forces and moments according to the training scenario (NLR, pg 70 - 76, pg 70, "Basic Aeordynamics", pg 72, "Forces Acting on the Airplane"; pg 74, "The torque of the engine causes a left rolling tendency").

[Claims 17, 31] Stern teaches a module for simulating turbulence (Stern, pg 283, "CHAPTER 13 Meterorology"; pgs 298 - 300; "flight simulator setting for turbulence"). Stern further states (Stern, pg 247, "Example: "Cessna N2001Z, Washington Tower. Taxi into position and hold runway three six. Traffic, a DC-9 landing runway 33. Be ready for immediate takeoff. (Pause). Cessna N2001Z, caution wake turbulence DC-9 landed runway three three, cleared for immediate takeoff. Traffic is a United seven twenty seven two mile final runway three six."(See Fiqure 11.2.)"). Stern does not make clear on a module for simulation of a wake vortex situation caused by an aircraft.

[Claims 17, 24, 30 - 31] NLR teaches a system / method (NLR, pg 11) for developing and applying tools for assessing appropriate (safe) wake vortex separation distances. The specific objectives of S-Wake: 1) To define suitable wake vortex behaviour classes depending on weather categories for wake vortex safety for aircraft on the approach glide path. 2) To improve the physical understanding of wake vortex evolution and decay in the atmosphere. 3) To establish realistic flight simulation environments for investigating wake vortex encounter safety aspects and pilot's response. 4) To develop encounter

severity (safety hazard) criteria, which relates the dynamic response of a wake vortex encountering aircraft to the encounter severity as perceived by the pilot. 5) To establish a probabilistic safety assessment environment. 6) To analyse the safety aspects for current practice. 7) To define possible new concepts which allow a safe mitigation of current separation rules under certain conditions. NLR teaches Stern's deficiency; specifically, a module (9) for simulation of a wake vortex situation caused by an aircraft (NLR, pg 5, "To Establish realistic flight simulation environments for investigating wake vortex encounter safety aspects and pilot's response. To develop encounter severity (safety hazard) criteria, which relates the dynamic response of a wake vortex encountering aircraft to the encounter severity as perceived by the pilot."; pgs 6 - 7, "In WP3 (managed by Airbus with contributions from CERFACS, IST-Lisbon, DLR, NLR, ONERA and TUB) flight simulations were made for vortex encounters of different aircraft sizes, wake strengths, wake intercept angles and wake intercept heights."; pg 11, "analytical wake vortex model for flight simulator", "numerical wake vortex model for flight simulator", "integrated WVE software module for flight simulators", "high-fidelity offline model for wake encounter simulation"; from pgs 33 - 44, "Flight simulations") is capable of determining a vortex generator wake vortex path as a set of the vorticity region centers (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 19, fig 11; pg 39; fig 26; pg 28; pg 43; NLR shows a pair of wake vortex paths as a set of the vorticity region centers) and intensity on the basis of information from the training scenarios database module (2) (NLR, pgs 12 - 14, "homogeneous isotropic turbulence (HIT) has been used by CERFACS to represent the ambient turbulence flow field. HIT fields were initially generated in the spectral space using the formulation of Von Kármán and Pao (Ref. 42). Several spectra were calculated and these evolve into HIT fields using the LES model. HIT fields were generated for turbulence intensities (Iu) equal to 1, 7, 10.5 and 24%.") and of information from the module (7) for simulation of the ambient parameters (NLR, pg 5, "Numerical simulation results of wake vortex behaviour in the atmosphere, under a variety of ambient atmospheric conditions (turbulence, stability, wind shear) were used to gain improved understanding of the transport and decay mechanisms. Simplified wake vortex transport and decay models were developed and were used in Work Packages 2-4."; pgs 12 - 14; pg 18, "Modelled ambient turbulence levels range from moderate to strong");

a module (10) for simulation of wake vortex perturbation effects on the aircraft is capable of evaluation of any aircraft additional forces and moments induced by the vortex generator wake vortices on the basis of information on the wake vortex path and intensity received from the module (9) for simulation of the wake vortex situation (NLR, pg 6, "In WP2 (managed by DLR and with contributions from Airbus, IFF/TU-Braunschweig, NLR, ONERA and TUB) Wake Vortex Encounter (WVE) models for quantifying the disturbing aerodynamic forces and moments were considered"; pg 22, "The development and validation of aerodynamic interaction models (AIM's) for calculating the additional forces and moments acting on an aircraft when entering a wake vortex. The models have to be used in the real-time computational environment of flight simulators (WP3) and in the "Probabilistic Safety Assessment" (WP4)."; pg 23, "Two simplified aerodynamic calculation methods suitable for real-time calculations of the wake vortex induced aerodynamic forces and moments were improved and tailored for application to realistic aircraft configurations."; pg 25, "The wake velocity field and the forces and moments on the traversed model had been measured."; pg 34, "The Wake Vortex Model supplies the input vortex flow field and the AIM calculates the vortex-induced forces and moments in each time step and adds them to the forces and moments computed with the basic aircraft simulation."; pg 35; pg 44), information on the aircraft parameters received from the training scenarios database module (2) (NLR, pgs 6 - 7, "In WP3 (managed by Airbus with contributions from CERFACS, IST-Lisbon, DLR, NLR, ONERA and TUB) flight simulations were made for vortex encounters of different aircraft sizes, wake strengths, wake intercept angles and wake intercept heights."; pg 43, "Wake vortex encounter response was investigated for 5 different aircraft (of different weight category)."; pg 10, fig 1, "Leading aircraft", "heavy, medium, small"), and information on aircraft position, angular rates, and geometrical characteristics received from a module (11) for simulation of the aircraft dynamics (NLR, pg 38, "various flight parameters (bank angles, roll rate, etc.)" - aircraft position; pg 28, "Risk assessments performed during piloted simulations in WP3 are being based on the interpretation of vertical acceleration, roll rate, pitch rate and bank angle."; pg 34, "To provide flight simulation capabilities for WVE simulations for five aircraft types of different geometry, size and weight.");

wherein the module (11) for simulation of the aircraft dynamics is forming signals imitating forces and moments induced by the vortex generator wake vortices (NLR, pg 6, "In WP2 (managed by DLR and with contributions from Airbus, IFF/TU-Braunschweig, NLR, ONERA and TUB) Wake Vortex Encounter (WVE) models for quantifying the disturbing aerodynamic forces and moments were considered"; pg 22, "The development and validation of aerodynamic interaction models (AIM's) for calculating the additional forces and moments acting on an aircraft when entering a wake vortex. The models have to be used in the real-time computational environment of flight simulators (WP3) and in the "Probabilistic Safety Assessment" (WP4)."; pg 23, "Two simplified aerodynamic calculation methods suitable for real-time calculations of the wake vortex induced aerodynamic forces and moments were improved and tailored for application to realistic aircraft configurations."; pg 25, "The wake velocity field and the forces and moments on the traversed model had been measured."; pg 34, "The Wake Vortex Model supplies the input vortex flow field and the AIM calculates the vortex-induced forces and moments in each time step and adds them to the forces and moments computed with the basic aircraft simulation."; pg 35; pg 44), and transmitting the signals to the module (6) for simulation of the pilot workplace (NLR, pg 5, "To establish realistic flight simulation environments for investigating wake vortex encounter safety aspects and pilot's response."), module (5) for simulation of the aviation instrument panel (NLR, pg 22, "The execution of wake vortex encounter (WVE) flight tests, involving a wake generating aircraft (ATTAS) and two different well instrumented wake chasing aircraft (Do128 and Cessna Citation II)."), and module (4) for imitation of outside visual situation on the basis of information from the module (10) for simulation of wake vortex perturbation effects on the aircraft (NLR, pg 6, "The observed flight trajectories and aircraft movements and accelerations agreed satisfactorily with those predicted by the developed AIMs. These models could therefore be used in the flight test simulations of WP3 and in the probabilistic safety assessment study made in WP4."; pg 34, "The Wake Vortex Model supplies the input vortex flow field and the AIM calculates the vortex-induced forces and moments in each time step and adds them to the forces and moments computed with the basic aircraft simulation"), from the training scenarios database module (2) (NLR,), and from the module (8) for simulation of the controls for the aircraft units and systems (NLR,

pgs 34 - pg 42; i.e., pg 36, "Airbus THOR flight simulator, NLR Research Flight Simulator, A330 Training simulator at TU Berlin, Do228 training simulator of Simtec").

[Claim 24] a module (17) of parameters of the vortex perturbation danger area, comprising:

a unit (20) for evaluation of perturbation hazard is capable of estimating a perturbation hazard level at a given point according to a chosen hazard criteria for the aircraft additional aerodynamic forces and moments induced by the vortex perturbations on the basis of information received from the unit (16) for determination of the forces and moments (NLR, pg 6, "In WP2 (managed by DLR and with contributions from Airbus, IFF/TU-Braunschweig, NLR, ONERA and TUB) Wake Vortex Encounter (WVE) models for quantifying the disturbing aerodynamic forces and moments were considered"; pg 22, "The development and validation of aerodynamic interaction models (AIM's) for calculating the additional forces and moments acting on an aircraft when entering a wake vortex. The models have to be used in the real-time computational environment of flight simulators (WP3) and in the "Probabilistic Safety Assessment" (WP4)."; pg 23, "Two simplified aerodynamic calculation methods suitable for real-time calculations of the wake vortex induced aerodynamic forces and moments were improved and tailored for application to realistic aircraft configurations."; pg 25, "The wake velocity field and the forces and moments on the traversed model had been measured."; pg 34, "The Wake Vortex Model supplies the input vortex flow field and the AIM calculates the vortex-induced forces and moments in each time step and adds them to the forces and moments computed with the basic aircraft simulation."; pg 35; pg 44), which belongs to the module (10) for simulation of wake vortex perturbation effects on the aircraft (NLR, pgs 6 - 7, "In WP3 (managed by Airbus with contributions from CERFACS, IST-Lisbon, DLR, NLR, ONERA and TUB) flight simulations were made for vortex encounters of different aircraft sizes, wake strengths, wake intercept angles and wake intercept heights."; pg 43, "Wake vortex encounter response was investigated for 5 different aircraft (of different weight category)."; pg 10, fig 1, "Leading aircraft", "heavy, medium, small"; pg 38, "various flight parameters (bank angles, roll rate, etc.)" - aircraft position; pg 28, "Risk assessments performed during piloted simulations in WP3 are being based on the

interpretation of vertical acceleration, roll rate, pitch rate and bank angle."; pg 34, "To provide flight simulation capabilities for WVE simulations for five aircraft types of different geometry, size and weight.");

a unit (21) for determination of danger points where the additional forces and moments induced by the vortex perturbations are dangerous (NLR, pg 6, "In WP2 (managed by DLR and with contributions from Airbus, IFF/TU-Braunschweig, NLR, ONERA and TUB) Wake Vortex Encounter (WVE) models for quantifying the disturbing aerodynamic forces and moments were considered"; pg 22, "The development and validation of aerodynamic interaction models (AIM's) for calculating the additional forces and moments acting on an aircraft when entering a wake vortex. The models have to be used in the real-time computational environment of flight simulators (WP3) and in the "Probabilistic Safety Assessment" (WP4)."; pg 23, "Two simplified aerodynamic calculation methods suitable for real-time calculations of the wake vortex induced aerodynamic forces and moments were improved and tailored for application to realistic aircraft configurations."; pg 25, "The wake velocity field and the forces and moments on the traversed model had been measured."; pg 34, "The Wake Vortex Model supplies the input vortex flow field and the AIM calculates the vortex-induced forces and moments in each time step and adds them to the forces and moments computed with the basic aircraft simulation."; pg 35; pg 44);

the unit is capable of determining the coordinates of points belonging to the danger area according the hazard criteria based on information received from the unit (20) for evaluation of perturbation hazard (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 39; fig 26; pg 28; pg 43; pg 19, fig 11; NLR shows coordinates of the control plane, area of the aircraft forecasted positions and wake vortex danger areas of vortex generators (i.e., pg 19, fig 11)),

a unit (22) for determination of a vortex perturbation danger area is capable of calculating the danger area geometrical characteristics on the basis of information received from the unit (21) for determination of danger points and transmitting the corresponding information (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 39; fig 26; pg 28; pg 43; pg 19, fig 11; NLR shows coordinates of the control

plane, area of the aircraft forecasted positions and wake vortex danger areas of vortex generators (i.e., pg 19, fig 11)); and

a warning module (18) (NLR, pg 52, "the Wake Vortex Warning System (WVWS) concept"), comprising:

a unit (23) for selection of a delay time is capable of calculating the time period within which the aircraft has at least a possibility of a flight evasive maneuver providing evasion of the aircraft from the generator wake danger area after the signal warning against the possibility of wake encounter has been received (NLR, pg 7, "Warning for unfavourable evolution of the vortices (in terms of position in relation to the follower aircraft) is there also most efficient."; pg 15, "Due to the stratification, the vortex spacing decreases with time t*=t/tref (see Fig. 6a). The circulation shows an initial gradual decay (this decay rate depends on the background turbulence level). The initial phase is followed by an accelerated decay phase (see Fig. 6b). This is caused by the development of co-operative instability mechanisms.");

a unit (24) for simulation of a control plane is capable of calculating the delay distance, which equals to the distance covered by the aircraft during the delay time, modeling the control plane situated in front of the aircraft perpendicular to its flight direction at the delay distance, and determining the forecasted time necessary for the aircraft to gain the control plane in the inertial frame (NLR, pg 7, "The WAVIR methodology of NLR provides a method to derive safe and appropriate separation distances."; pg 8, "The current wake vortex separation rules define separation distances depending on the MTOW of the paired aircraft."; pg 44, "A probabilistic Wake Vortex Induced Risk assessment model (WAVIR method of NLR) has been developed to assess safe separation distances."; pg 45, fig 30, "Risk management procedure to derive safe and appropriate separation minima"; pg 47; pg 49, "minor incident risk", "major incident risk");

a forecasting unit (25) is capable of determining a generator wake path in the form of the set of the generator vorticity region centers (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 19, fig 11; pg 39; fig 26; pg 28; pg 43; NLR shows a pair of wake vortex paths as a set of the vorticity region centers) with respect to the inertial frame and of the intensity of the generator wake vortices at the forecasted time on

the basis of information from the unit for simulation of wake vortices in the module for simulation of vortex situation (NLR, pgs 12 - 14, "homogeneous isotropic turbulence (HIT) has been used by CERFACS to represent the ambient turbulence flow field. HIT fields were initially generated in the spectral space using the formulation of Von Kármán and Pao (Ref. 42). Several spectra were calculated and these evolve into HIT fields using the LES model. HIT fields were generated for turbulence intensities (Iu) equal to 1, 7, 10.5 and 24%.");

a unit (26) for calculation of intersection points is capable of determining the coordinates of the intersection points of the generator wake vortex trajectory and the control plane at the forecasted time of the aircraft flight through it (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pgs 19 - 20, fig 11, "which was developed outside the S-Wake project, might be considered for future applications as a wake vortex prediction method as part of a dynamic wake vortex separation scheme... The idea behind the introduction of the Wake Vortex Behaviour Class (WVBC) concept is that it is a challenge to predict the wake vortex decay and behaviour of individual vortices along the complete glide path in an operational system."; pg 39; fig 26; pg 28; pg 43; NLR shows a pair of wake vortex paths as a set of the vorticity region centers;);

an areas and regions forming unit (27) is capable of forming around an intersection point of the wake vortex path and the control plane of the wake vortex danger area in the form of the set of the generator vorticity danger areas, where the entering aircraft may have the flight parameters exceeding the admissible limits, forming in the control plane of the area of the aircraft forecasted positions at the forecasted time of the aircraft intersection with the control plane with due regard to the flight regulations, forming around the region of the aircraft forecasted positions of the alert area, the information on the entrance of the wake danger areas into the alert area will be provided to the user (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pgs 19 - 20, fig 11, "which was developed outside the S-Wake project, might be considered for future applications as a wake vortex prediction method as part of a dynamic wake vortex separation scheme... The idea behind the introduction of the Wake Vortex

Behaviour Class (WVBC) concept is that it is a challenge to predict the wake vortex decay and behaviour of individual vortices along the complete glide path in an operational system."; pg 39; fig 26; pg 28; pg 43; NLR shows a pair of wake vortex paths as a set of the vorticity region centers; pg 9, "It has to be noted that today's navigation accuracy in principle allows radar separations to be 2.5 NM or less, but that the minimum wake vortex separations often require much larger separations (see figure 1)");

a transformation unit (28) is capable of calculating coordinates of the area of the aircraft forecasted positions, the alert area and the wake vortex danger area in the aircraft frame (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 19, fig 11; pg 39; fig 26; pg 28; pg 43; NLR shows wake vortex danger area (NLR, i.e., pg 41, "NO Go Around (NOGAs)"));

a first intersection conditional test unit (29) is capable of calculating the distance from the alert area to the wake vortex danger area and marking its nulling (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 39; fig 26; pg 28; pg 43; pg 19, fig 11; NLR shows coordinates of the control plane, area of the aircraft forecasted positions and wake vortex danger areas of vortex generators (i.e., pg 19, fig 11));

a second intersection conditional test unit (30) is capable of calculating the distance from the area of the aircraft forecasted positions to the wake vortex danger area and marking its nulling (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 39; fig 26; pg 28; pg 43; pg 19, fig 11; NLR shows coordinates of the control plane, area of the aircraft forecasted positions and wake vortex danger areas of vortex generators (i.e., pg 19, fig 11));

an indication unit (31) containing at least one indication device is capable of indicating the nulling of the distance from the alert area to the generator wake vortex danger area (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 39; fig 26; pg 28; pg 43; pg 19, fig 11; NLR shows danger area (i.e., pg 17, fig 8; pg 45, fig 30));

an emergency indication unit (32) containing at least one indication device is capable of indicating the nulling of the distance from the area of the aircraft forecasted positions to the danger area of the generator wake vortices (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 39; fig 26; pg 28; pg 43; pg 19, fig 11; NLR shows danger area (i.e., pg 17, fig 8; pg 45, fig 30)) and the indication device is capable of indicating the nulling of the distance from the alert area to the generator wake vortex danger area and the indication device capable of indicating the nulling of the distance from the area of the aircraft forecasted positions to the danger area of the generator wake vortices (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 39; fig 26; pg 28; pg 43; pg 19, fig 11; NLR shows danger area (i.e., pg 17, fig 8; pg 45, fig 30)) are chosen from the group containing devices of visual (NLR, pg 17, fig 8; pg 45, fig 30)), audio and tactile indication;

a module for simulation of noise, optical and dynamic effects (NLR, pg 36); and

a module of visualization including a visualization device is capable of forming the image at least of the area of the aircraft forecasted positions and wake vortex danger areas on the basis of information received from the warning module (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 39; fig 26; pg 28; pg 43; pg 19, fig 11; NLR shows visualization device (i.e., pg 17, fig 8; pg 45, fig 30)).

[Claim 30] a unit (13) for simulation of vortex generator dynamics including a vortex generator tracker is capable of receiving information on the vortex generator position, motion parameters, geometrical and weight characteristics from the scenarios database module (2) and a memory unit capable of storing information on the vortex generator position and motion parameters (NLR, pg 5, "Numerical simulation results of wake vortex behaviour in the atmosphere, under a variety of ambient atmospheric conditions (turbulence, stability, wind shear) were used to gain improved understanding of the transport and decay mechanisms. Simplified wake vortex transport and decay models were developed and were used in Work Packages 2-4."; pgs 12 - 14; pg 18, "Modelled ambient turbulence levels range from moderate to strong");

a unit (14) for simulation of wake vortices including a wake vortex tracker is capable of determining a vortex generator wake vortex path in the form of a set of the vorticity region center trajectories and intensity on the basis of information from the module (7) for simulation of the ambient parameters and module (13) for simulation of vortex generator dynamics, and also is capable of saving the information on coordinates of points of the vortex generator wake vortex path in the form of a set of the vorticity region center trajectories and intensity (NLR, pgs 12 - 14, "homogeneous isotropic turbulence (HIT) has been used by CERFACS to represent the ambient turbulence flow field. HIT fields were initially generated in the spectral space using the formulation of Von Kármán and Pao (Ref. 42). Several spectra were calculated and these evolve into HIT fields using the LES model. HIT fields were generated for turbulence intensities (Iu) equal to 1, 7, 10.5 and 24%."; pg 5, "Numerical simulation results of wake vortex behaviour in the atmosphere, under a variety of ambient atmospheric conditions (turbulence, stability, wind shear) were used to gain improved understanding of the transport and decay mechanisms. Simplified wake vortex transport and decay models were developed and were used in Work Packages 2-4."; pgs 12 - 14; pg 18, "Modelled ambient turbulence levels range from moderate to strong"; pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pgs 19 - 20, fig 11, "which was developed outside the S-Wake project, might be considered for future applications as a wake vortex prediction method as part of a dynamic wake vortex separation scheme... The idea behind the introduction of the Wake Vortex Behaviour Class (WVBC) concept is that it is a challenge to predict the wake vortex decay and behaviour of individual vortices along the complete glide path in an operational system."; pg 39; fig 26; pg 28; pg 43);

and the module (10) for simulation of wake vortex perturbation effects on the aircraft comprises (NLR, pg 23, "Two simplified aerodynamic calculation methods suitable for real-time calculations of the wake vortex induced aerodynamic forces and moments were improved and tailored for application to realistic aircraft configurations." pg 34, "The Wake Vortex Model supplies the input vortex flow field and the AIM calculates the vortex-induced forces and moments in each time step and adds them to the forces and moments computed with the basic aircraft simulation.";)::

a unit (15) for the aircraft schematization is capable of calculating a set of the aircraft geometrical characteristics necessary for calculation of the aircraft additional aerodynamic forces and moments induced by the vortex generator wake vortices on the basis of information on the aircraft type and configuration the training scenario database module (2) (NLR, pg 6, "In WP2 (managed by DLR and with contributions from Airbus, IFF/TU-Braunschweig, NLR, ONERA and TUB) Wake Vortex Encounter (WVE) models for quantifying the disturbing aerodynamic forces and moments were considered"; pg 22, "The development and validation of aerodynamic interaction models (AIM's) for calculating the additional forces and moments acting on an aircraft when entering a wake vortex. The models have to be used in the real-time computational environment of flight simulators (WP3) and in the "Probabilistic Safety Assessment" (WP4)."; pg 23, "Two simplified aerodynamic calculation methods suitable for real-time calculations of the wake vortex induced aerodynamic forces and moments were improved and tailored for application to realistic aircraft configurations."; pg 25, "The wake velocity field and the forces and moments on the traversed model had been measured."; pg 34, "The Wake Vortex Model supplies the input vortex flow field and the AIM calculates the vortex-induced forces and moments in each time step and adds them to the forces and moments computed with the basic aircraft simulation."; pg 35; pg 44; pgs 6 - 7, "In WP3 (managed by Airbus with contributions from CERFACS, IST-Lisbon, DLR, NLR, ONERA and TUB) flight simulations were made for vortex encounters of different aircraft sizes, wake strengths, wake intercept angles and wake intercept heights."; pg 43, "Wake vortex encounter response was investigated for 5 different aircraft (of different weight category)."; pg 10, fig 1, "Leading aircraft", "heavy, medium, small"; pg 38, "various flight parameters (bank angles, roll rate, etc.)" - aircraft position; pg 28, "Risk assessments performed during piloted simulations in WP3 are being based on the interpretation of vertical acceleration, roll rate, pitch rate and bank angle."; pg 34, "To provide flight simulation capabilities for WVE simulations for five aircraft types of different geometry, size and weight."), and; and

a unit (16) for determination of the above mentioned forces and moments on the basis of information on the coordinates of points of the vortex generator wake vortex path in the form of the set of the vorticity region center trajectories and intensity saved by the unit (14) for simulation of wake vortices and of information on the aircraft position, flight velocity, angular rates, and geometrical characteristics

received from the module (11) for simulation of the aircraft dynamics (NLR, pg 38, "various flight parameters (bank angles, roll rate, etc.)" - aircraft position; pg 28, "Risk assessments performed during piloted simulations in WP3 are being based on the interpretation of vertical acceleration, roll rate, pitch rate and bank angle."; pg 34, "To provide flight simulation capabilities for WVE simulations for five aircraft types of different geometry, size and weight.").

[Claim 31] a system (12) for estimation of the pilot actions comprises a memory device for saving information on the coordinates of the control plane, area of the aircraft forecasted positions and wake vortex danger areas of vortex generators located in the aircraft vicinity at least within the time of emergency indication of the nulling event for the distance from the area of the aircraft forecasted positions to the danger area of the vortex generator wake (NLR, pg 17, fig 8, "Vortex trajectory of a Boeing 747-200 in terminal approach to London-Heathrow (Ref. 38)", vortex trajectory - vortex path; pg 14, fig 4; pg 39; fig 26; pg 28; pg 43; pg 19, fig 11; NLR shows coordinates of the control plane, area of the aircraft forecasted positions and wake vortex danger areas of vortex generators (i.e., pg 19, fig 11)).

[Claims 17, 24, 30 - 31] Therefore, in view of NLR, it would have been obvious to one of ordinary skill in the art, at the time of invention, to modify the system described in Stern, by providing the wake vortex simulation as taught by NLR, since NLR states (NLR, pg 5) "With increasing air-traffic congestion problems around major airports and the approaching introduction of larger transport aircraft, the problem of wake vortex induced risks for aircraft following other aircraft has gained new interest ... The specific objectives of S-Wake were: vortex safety for aircraft on the approach glide path. • To improve the physical understanding of wake vortex evolution and decay in the atmosphere. • To establish realistic flight simulation environments for investigating wake vortex encounter safety aspects and pilot's response. • To develop encounter severity (safety hazard) criteria, which relates the dynamic response of a wake vortex encountering aircraft to the encounter severity as perceived by the pilot. • To establish a probabilistic safety assessment environment. • To analyse the safety aspects for current practice. • To define possible new concepts which allow a safe mitigation of current separation rules under certain conditions."

[Claims 17, 24, 30 - 31] Microsoft Flight simulator 95 record a course and display course (Stern, pg 153; pg 507). But Stern does not make clear a system for evaluation of the pilot. However, NASA teaches a piloted simulation study has been conducted in a research simulator to provide a means to estimate the effects of different levels of wake turbulence on final approach. NASA teaches stern's deficiency; specifically, a system for evaluation of the pilot actions is capable of estimating correctness of the pilot actions against the flight situation hazardous for the aircraft on the basis of information received from the module (4) for imitation of an outside visual situation and the module (5) for simulation of the instrument panel (NASA, pgs 4 - 5, "Test Subject"; "Pilot training"; " A copy of the rating scale (Figure 4) was also included with an explanation of how the rating scale was to be used. " - estimating correctness of the pilot actions against the flight situation hazardous for the aircraft.; pg 4, "These seven disturbance patterns were randomly mixed with six different vortex strength levels"; pg 2 - 4, "Simulator"; pg 2, "10-point rating scale was developed which uses familiar atmospheric turbulence terminology. This scale was used by the pilots to evaluate various levels of wake turbulence in a piloted, motion-base simulator."; pg 3, "an electronic flight instrument panel, as well as a sound system. Two of the four visual systems provided views through the forward windows,"). Therefore, in view of NASA, it would have been obvious to one of ordinary skill in the art, at the time of invention, to modify the system described in Stern, by providing the pilot evaluation as taught by NASA, since NASA states (NASA, pg 2) "The present study attempts to provide a means to estimate the vortex strength for a given subjective response or vice versa. In addition, the results of the study will make it possible to estimate the pilot's and the airplane's objective responses for the given conditions. A 10-point rating scale was developed which uses familiar atmospheric turbulence terminology. This scale was used by the pilots to evaluate various levels of wake turbulence in a piloted, motion-base simulator. In order to provide an extra margin of safety in the final estimates, a "worst-case methodology" was used in the design of the experiment. For example, the experimental scenario included poor visibility conditions, multiple wake disturbances, a short runway, and a simulated airplane with a small wing scrape angle." NASA further states (NASA, pg 1) "The National Aeronautics and Space Administration (NASA) is developing the technology for a system to safely increase airport

capacity in instrument meteorological conditions (IMC). The system, called the Aircraft Vortex Spacing System or AVOSS, is designed to allow reduced airplane spacing in IMC conditions in the airport terminal area." Furthermore, it was known that training simulators include flight simulators for training aircraft pilots in order to provide them with a lifelike experience. Simulation is also used for scientific modeling of natural systems or human systems in order to gain insight into their functioning. Simulation can be used to show the eventual real effects of alternative conditions and courses of action.

Re claim 18:

Stern discloses the simulator as claimed in claim 17 wherein the module (6) for simulation of the pilot workplace is made with a possibility of changing its attitude and is equipped with a device for dynamic imitation of flight (Stern, from pg 26, "Visual Flight").

Re claim 21:

Stern discloses the simulator as claimed in claim 17 wherein the training scenarios are chosen from the group consisting of takeoff and landing at a ground airdrome (Stern, from pg 26, "Visual Flight"; pg 34, "Takeoff"; pg 40, "Landing"), takeoff and landing at the aircraft carrier, individual and formation flight, flight refueling, and combinations thereof.

Re claim 20:

Stern discloses the simulator as claimed in claim 17, further comprising a module for simulation of noise, optical and dynamic effects (Stern, from pg 26, "Visual Flight", pg 139, "sound of the slowing airflow…").

Re claim 22:

Stern discloses the simulator as claimed in claim 17, wherein it is implemented in software of the simulator modules of the operation of the simulator's modules and the module (7) for simulation of the danger area parameters includes a database of characteristics of wake vortex danger areas for different types of vortex generators (Stern, pg 298 - 300; pg 283 - 312; pg 304 - 312).

Re claim 25:

Stern discloses the simulator as claimed in claim 24 wherein the unit (23) for selection of the delay time can perform the current correction of the delay time in a manual or semiautomatic or automatic mode (Stern, pg 343 - 344, "Weather Briefing"; from pg 315, "Enroute Charts"), the unit (27) is developed with a possibility of performing the current correction of the coordinates of the alert area and area of the aircraft forecasted positions in a manual or semiautomatic or automatic mode, the unit (22) for determination of the danger area parameters could be designed with a possibility of approximating the boundaries of the vortex generator wake vortex danger area (Stern, pg 343 - 344, "Weather Briefing"; from pg 315, "Enroute Charts"; pg 298 - 312).

Re claim 26:

Stern discloses the simulator as claimed in claim 24 wherein the aircraft admissible roll moment induced by wake vortices is chosen as the hazard criterion (Stern, pg 283 - 312).

Re claim 27:

Stern discloses the simulator as claimed in claim 24 wherein the admissible value of the aircraft roll angle is chosen as the hazard criterion (Stern, pg 298 - 300).

Re claim 28:

Stern discloses the simulator as claimed in claim 24 wherein it is implemented in software of the simulator modules of the operation of the simulator's modules and the module (7) for simulation of the danger area parameters comprises the database of characteristics of wake vortex danger areas for different types of vortex generators (Stern, pg 293 - 300).

Re claim 29:

Stern discloses the simulator as claimed in claim 24 wherein the system (12) for estimation of the pilot actions comprises a memory device for saving information on the coordinates of the control plane (Stern, pg 153, "3. Select Record Course and Display Course"), area of the aircraft forecasted positions and wake vortex danger areas of vortex generators located in the aircraft vicinity at least within the time of emergency indication of the nulling event for the distance from the area of the aircraft forecasted positions to the danger area of the vortex generator wake vortices (Stern, pg 343 - 344, "Weather Briefing"; from pg 315, "Enroute Charts"; pg 298 - 312).

Response to Arguments

8. Applicant's arguments with respect to claims 17 - 18, 20 - 22, 24 - 31 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

"A method for assessing the impact of wake vortices on USAP operations" by G. KURYLOWICH (7/1979).

"LARGE EDDY SIMULATIONS OF AIRCRAFT WAKE VORTICES IN A HOMOGENEOUS ATMOSPHERIC TURBULENCE" by Jongil Han (1998)

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action

is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JACK YIP whose telephone number is (571)270-5048. The examiner can normally be reached on Monday - Friday 9:30am - 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xuan Thai can be reached on (571)272-7147. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. Y./
Examiner, Art Unit 3715

/XUAN M. THAI/
Supervisory Patent Examiner, Art Unit 3715